

### **REMARKS**

Claims 1-31 are pending. Claims 18-21, and 24 have been amended. Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

#### **In the Drawings**

The drawings were objected to under 37 C.F.R. § 1.83(a). Specifically, the Examiner indicates that adjusting means AM, the light source LA within the housing of the lithographic projection apparatus, and second harmonic interferometer having operating wavelengths  $\lambda_2$  and  $\lambda_3$  are not shown in the drawings. With respect to the adjusting means AM, Applicants have amended the specification to remove reference to the designation AM. With respect to the light source LA within the housing of the lithographic projection apparatus, Applicants submit that Figure 1, as described in the description of the drawings, is a lithographic projection apparatus and that the housing of the lithographic projection apparatus is not and need not be shown. Lastly, with respect to the second harmonic interferometer having operating wavelengths  $\lambda_2$  and  $\lambda_3$ , Applicants submit that in an embodiment of the invention (Embodiment 2, page 17, paragraph [0051], the interferometric measuring means IF comprises an interferometric displacement measuring device and a second harmonic interferometric device. Accordingly, the drawings do show the second harmonic interferometer having operating wavelengths  $\lambda_2$  and  $\lambda_3$ . Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

#### **Claim Objections**

Claim 20 was objected to because there was no antecedent basis for " $\lambda_2$  and  $\lambda_3$ ". Applicants have amended claim 20 to correct the typographical error in claim 20. Specifically, Applicants have amended claim 20 to depend from claim 15. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

#### **Claim Rejections Under 35 U.S.C. § 102**

Claims 1, 2, 16, 20-26, and 30 were rejected under 35 U.S.C. § 102(b) over Miyaji et al. (U.S. Patent No. 5,559,584). Applicants respectfully traverse this rejection.

Claim 1 recites, in part, a lithographic projection apparatus which includes a displacement measuring interferometer which has an operating wavelength of  $\lambda_1$  and a purge

gas which has a refractive index at a wavelength  $\lambda_1$  which is substantially the same as that of air. Miyaji, as indicated by the Office Action, teaches (column 1, line 66) that the optical path must be filled with an inert gas such as nitrogen. Although the Office Action alleges that the refractive index of air (1.000292) and nitrogen (1.000297) are substantially similar, it would be understood by a person skilled in the art that a difference of 5 parts per million in the context of a lithographic apparatus are not substantially similar. In further support, Applicants submit herewith a Declaration under 37 C.F.R. 1.132 signed by an inventor attesting to these facts. Thus Miyaji's teaching of  $N_2$  fails to teach or suggest a displacement measuring interferometer which has an operating wavelength of  $\lambda_1$  and a purge gas which has a refractive index at a wavelength  $\lambda_1$  which is substantially the same as that of air, as recited in claim 1.

Additionally, Miyaji does not disclose an operating wavelength for interferometers 6X and 6Y. In fact, even if a person skilled in the art were to select a wavelength of operation for the interferometers 6X and 6Y, there is no suggestion in Miyaji that the wavelength be the same as the wavelength used to calculate the refractive index of the purge gas. Accordingly, Miyaji does not teach or suggest, at least, a displacement measuring interferometer which has an operating wavelength of  $\lambda_1$  and a purge gas which has a refractive index at a wavelength  $\lambda_1$  which is substantially the same as that of air, as recited in claim 1.

Similarly, claim 26, is believed allowable for at least the same reasons presented above since claim 26 recites determining the position of a table using an interferometer which has an operating frequency of  $\lambda_1$  and providing a purge gas which has a refractive index at a wavelength  $\lambda_1$  which is substantially the same as that of air. Miyaji fail to teach or suggest the recited purge gas.

Claims 2 and 30 are believed allowable for at least the same reasons presented above with respect to claims 1 and 26 by virtue of their dependence upon claims 1 and 26 and for the additional features recited by these claims. For example, claim 2 recites that the purge gas comprises two or more components selected from  $N_2$ , He, Ar, Kr, Ne, and Xe. In contrast, Miyaji discloses, column 1, lines 50-54, that the inert gas can be nitrogen or helium. Therefore, Miyaji does not teach that the purge gas comprises two or more components selected from  $N_2$ , He, Ar, Kr, Ne, and Xe, as recited in claim 2. Further, Miyaji does not teach or suggest anything about a combination of the chosen gases (which constitute the purge gas) having a refractive index at a wavelength  $\lambda_1$  which is substantially the same as that of air.

Additionally, claims 16 and 20-25 are believed allowable for at least the same reasons claim 15 was not rejected above by virtue of their dependence upon claim 15. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1, 2, 16, 20-26, and 30 under 35 U.S.C. § 102(b) based on Miyaji.

**Claim Rejections Under 35 U.S.C. § 103**

A. Claims 3-8 and 31 were rejected under 35 U.S.C. § 103(a) over Miyaji. Applicants respectfully traverse this rejection.

Claims 3-8 and 31 are believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of their dependence upon claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

B. Claims 9-15, 17-19, and 27-29 were rejected under 35 U.S.C. § 103(a) over Miyaji in view of Henshaw et al. (U.S. Patent No. 5,991,033). Applicants respectfully traverse this rejection because Henshaw fails to overcome the deficiencies of Miyaji discussed above.

Claims 12 and 28 each recite that the purge gas comprises at least two components. As described above, Miyaji does not teach that more than one component, i.e., nitrogen is used as the purge gas. Additionally, Henshaw does not teach what components constitute the atmosphere. In fact, Henshaw is not concerned with the composition of the atmosphere since Henshaw discloses a device which compensates for turbulence. Accordingly, no combination of Miyaji and Henshaw teach or suggest that the purge gas comprises at least two components, as recited in claims 12 and 28.

Additionally, claims 15 and 29 each recite a relationship,  $L = (DI) \cdot K(SHI)$  where L is the adjusted displacement measuring interferometer measurement, SHI is the measurement of the second harmonic interferometer, K is a coefficient, and DI is the measurement of the displacement measuring interferometer. Henshaw does not teach such a relationship at least because Henshaw is concerned with correcting errors which are due to turbulence. Accordingly, no combination of Miyaji and Henshaw teach or suggest a relationship,  $L = (DI) \cdot K(SHI)$  where L is the adjusted displacement measuring interferometer measurement, SHI is the measurement of the second harmonic interferometer, K is a coefficient, and DI is the measurement of the displacement measuring interferometer, as recited in claims 15 and 29.

Claims 9-11, 13, 14, 17-19, and 27 are believed allowable for at least the reasons presented above with respect to claims 1, 12, 15, and 26 by virtue of their dependence upon

claims 1, 12, 15, and 26. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 9-11, 13, 14, 17-19, and 27 under 35 U.S.C. § 103(a) based on Miyaji in view of Henshaw.

**Conclusion**


In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Attached is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned **“Version with markings to show changes made”**.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Paragraph [0034] has been amended as follows:

The radiation system comprises a source LA (*e.g.* an Hg lamp or an excimer laser) that produces a beam of radiation. This beam is fed into an illumination system (illuminator) IL, either directly or after being passed through conditioning means, such as a beam expander Ex, for example. The illuminator IL comprises adjusting means [AM] for setting the outer and/or inner radial extent (commonly referred to as  $\sigma$ -outer and  $\sigma$ -inner, respectively) of the intensity distribution in the beam. In addition, it will generally comprise various other components, such as an integrator IN and a condenser CO. In this way, the beam PB impinging on the mask MA has a desired uniformity and intensity distribution in its cross-section.

IN THE CLAIMS:

Claims 18-21, and 24 have been amended as follows:

18. (Amended) An apparatus according to claim 15, wherein the purge gas comprises at least 95% by volume of at least one of Ne and He.

19. (Amended) An apparatus according to claim 15, wherein the purge gas comprises from 94 to 96 % by volume  $N_2$  and from 4 to 6% by volume of at least one of Ne and He.

20. (Amended) An apparatus according to claim [1] 15, wherein  $\lambda_1$  is about 633nm,  $\lambda_2$  is about 532nm and  $\lambda_3$  is about 266nm.

21. (Amended) An apparatus according to claim [1] 15, wherein said purge gas supply comprises a gas flow regulator to control a rate of flow of purge gas to said space and a pump to remove purge gas from said space.

24. (Amended) An apparatus according to claim [1] 15, wherein said radiation of said projection beam has a wavelength less than about 180nm.

**End of Appendix**